TECHNICAL NOTES

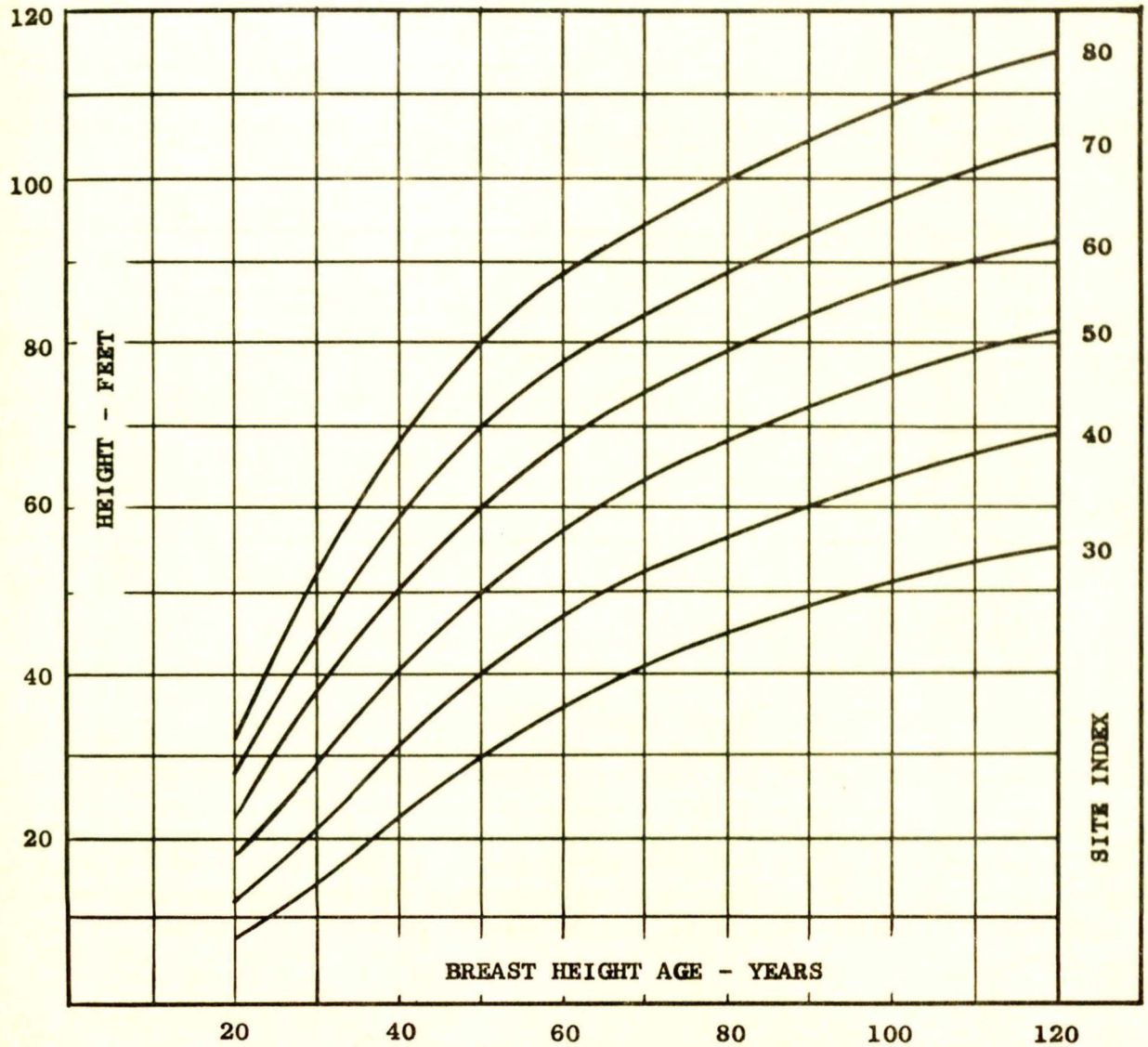
LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 474

Site Index Curves for White Spruce in the Lake States

This site index graph is one of a series prepared for commercially important species in the Lake States. Some of the basic material has appeared in previous publications, most of which are no longer available. Because of field demand, the series is being published in convenient looseleaf form as technical notes. A statement on site index use and limitations is on the reverse side.

WHITE SPRUCE



Source: Based on forest survey data collected in Minnesota during 1947-49 by the Lake States Forest Experiment Station and the Office of Iron Range Resources and Rehabilitation.

January 1957

S. R. GEVORKIANTZ, Forester

MAINTAINED AT ST. PAUL 1, MINNESOTA, IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA

Site Index--Its Use and Limitations

Site index is the height attainable by the average dominant and codominant trees in relatively pure, even-aged, and well-stocked stands at the age of 50 years. It reflects the combined effect of different environmental factors and is used as a measure of stand productivity.

To evaluate site index, a number of sample trees in a stand should be measured for total height and age. Only dominant and codominant trees should be used. These trees are part of the main canopy or extend above it, receiving full light from above but comparatively little from the sides. A good rule-of-thumb for an adequate sample of height measurements or age borings is

$$n = 5 + \frac{R^2}{30}$$

where R = observed range of total heights or ages in the stand. The selection of these sample trees should be made in some systematic manner, covering the range of diameter classes to insure a representative sample. The curves recognize total age except for white spruce and balsam fir where age at breast height is used.

After the sample tree measurements have been taken, the average total height and the average age should be computed, using basal areas or squares of diameters as weights. A sample calculation is given below:

D.b.h. (inches) (d)	Dominant and codominant heights (feet)	Average height (feet) (h)	Number of samples (n)	Computations			
				(d^2)	(nd^2)	(w) 1/	(wh)
7	48, 52	50	2	49	98	1.0	50
8	52, 55, 58	55	3	64	192	2.0	110
9	56, 57, 58	57	3	81	243	2.5	142
10	58, 60	59	2	100	200	2.0	118
Sum			10			7.5	420

Average height $= \frac{420}{7.5} = 56$

1/ Relative weights (w) are based on $nd^2 = 100 = 1.0$

In estimating site index, the following limitations should be considered:

1. The index will not apply to any stands whose development, because of climatic or soil peculiarities, is expected to be widely different from the average trend portrayed by the curves. The curves assume that percent deviation of observed height above or below the central trend remains constant throughout the life of the stand.

2. The site index cannot be properly evaluated in stands where dominant and codominant trees have been affected by past suppression.

3. The curves should not be applied to extremely dense or very open stands where stagnation or excessive crown development is observed.